

# MONTHLY WEATHER REVIEW,

## JULY, 1878.

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WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

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### INTRODUCTION.

In compiling the present REVIEW the following data, received up to August 13th, have been made use of, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 116 Signal Service stations and 12 Canadian stations, as telegraphed to this office; monthly journals and means, 121 and 141 respectively, from the former, and monthly means from 14 of the latter; reports from 22 special Sunset stations; 228 monthly registers from Voluntary Observers; 36 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly report of the Weather Service of the State of Iowa; reliable newspaper extracts; special reports.

Instructions have been issued establishing stations of the *1st Class*, as follows:—May 18th, 1878, Deadwood to be discontinued, and Lead City, Dakota, to be established; June 22nd, establishing Columbus, Ohio; July 8th, Atlanta, Ga., Des Moines, Iowa, and Madison, Wis.; July 10th, Chattanooga, Tenn., and Charlotte, N. C. Lead City began reporting June 1st; Columbus, July 1st; Des Moines, August 1st. The following have been announced as *Display Stations*, (for displaying Cautionary Signals,) viz:—September 16th, 1877, Menomonee, Mich., and Sturgeon Bay, Horn's Pier, Kewaunee, Sheboygan, Racine, Green Bay, Kenosha and Manitowoc, Wis., as *Section One*, with Milwaukee as a centre. August 8th, 1878, New Buffalo, Mich., to repeat Chicago signals. January 20th, Ludington, Mich.; July 8th, Pentwater, Traverse City, Frankfort and Northport, Mich.; July 23rd, St. Joseph and South Haven, Mich., as *Section Three*, with Grand Haven as the centre. July 8th, Mackinac, Mich. July 15th, Bay City, East Tawas, Forrester, Port Austin and Rogers City, Mich., as *Section Four*, with Detroit as the centre. July 8th, Monroe, Mich., Fairport and Ashtabula, Ohio, and Dunkirk, N. Y., as *Section Five*, with Cleveland as the centre. July 8th, Charlotte, N. Y., to repeat the Rochester signals. July 8th, Cape Vincent, N. Y., as *Section Six*, with Oswego as the centre. August 1st, Millbridge, Belfast, Deer Island and Booth Bay, Me., and Portsmouth, N. H., as *Section Seven*, with Portland as the centre. August 1st, Newburyport, Thatcher's Island, Marblehead, Highland Light, Chatham, Hyannis and New Bedford, Mass., as *Section Eight*, with Boston as the centre. August 1st, Watch Hill, R. I., to repeat the New London signals. February 25th, Lewes, Del. July 1st, Old Topsail Inlet, (Fort Macon,) N. C.

### BAROMETRIC PRESSURE.

Upon chart No. II is shown the general distribution of the atmospheric pressure for the month by the isobaric lines. Compared with the means for July of previous years, the pressure for the present month averages slightly lower for all the districts, except along Lake Superior, where it has been slightly higher.

The *Local Barometric Ranges*, as reduced to sea-level, for the month, vary as follows: New England, from 0.68 of an inch at New Haven to 0.97 at Burlington; Middle Atlantic States, 0.46 at Cape Henry to 0.69 at Albany; South Atlantic States, 0.36 at Jacksonville to 0.46 at Wilmington; Gulf States, 0.30 at New Orleans to 0.33 at Key West, 0.42 at Corsicana, and 0.54 at Camp Stockton; Ohio valley and Ten-

nessee, 0.42 at Memphis to 0.69 at Pittsburg; Lower Lake region, 0.75 at Sandusky to 0.90 at Oswego; Upper Lake region, 0.59 at Alpena to 0.70 at Chicago; Upper Mississippi valley, 0.57 at St. Paul to 0.69 at Davenport; Red River of the North valley, 0.76 at Breckenridge and Pembina; Missouri valley, 0.60 at Leavenworth to 0.79 at Bismarck; Plains of Nebraska and Kansas, 0.68 at Dodge City to 0.78 at North Platte; Rocky Mountains, 0.32 at Santa Fé to 0.39 at Denver; Utah, 0.55 at Salt Lake City; Idaho Territory, 0.46 at Boise City; Nevada, 0.39 at Winnemucca to 0.43 at Pioche; California, 0.25 at Los Angeles to 0.29 at San Francisco and 0.33 at Red Bluff; Oregon, 0.43 at Roseburg to 0.49 at Portland.

*Areas of High Barometer.*—Of these, six are described. None of them were very decided, and little interest attaches to them.

No. I.—This is a continuation of the area of high pressure described in the June Review as No. IX. 1st, it covered the Northwest, with cool, clear or clearing weather. At midnight the barometers, corrected for temperature and instrumental errors, read about 0.20 of an inch above the normals from Minnesota to western Kansas. 2nd, the central highest pressure advanced to Lake Superior, with cool, northerly winds and clear weather, thence toward Texas; midnight barometer at Marquette 30.20 in., or 0.25 above normal. 3rd, the pressure continued nearly stationary over the Upper Lakes and increasing toward the St. Lawrence valley. 4th, a. m. barometers at Duluth and Montreal 0.30 and 0.31, respectively, above the normals. During the day the pressure rapidly diminished in the St. Lawrence valley, and by midnight the highest covered Lake Superior. 5th, continued over the Lake region, with diminished pressure. 6th and 7th, it disappeared in advance of low pressure No. II.

No. II.—9th, it advanced southeastward over Manitoba and northern Dakota. 10th, it reached the Lake region, with cool, northerly winds; p. m. barometer at Marquette 0.21 above normal. 11th, moved to the St. Lawrence valley; midnight barometers at Montreal and Quebec 0.33 above normals. 12th, disappeared southeastward over New England.

No. III.—From the 7th to the 11th the pressure was above the normal along the South Atlantic coast, with generally clear weather. 12th, it reached its maximum; a. m. barometer at Cape Hatteras 30.24 in., or 0.21 above normal.

No. IV.—During the 12th and 13th the pressure rose in Oregon. 14th, a. m., barometer at Portland 30.26 in., or 0.28 above normal. During the day it apparently withdrew to the northward.

No. V.—19th, following storm No. VIII, it was observed at night as advancing southeastward over Manitoba and Dakota. 20th, northerly winds, generally cool, clear weather and rising barometer prevailed in the Northwest; p. m. barometer at Pembina 0.28 above normal. 21st, a. m. barometer at Pembina 30.26 in., or 0.36 above normal. In connection with the area of low pressure in its advance, high northerly winds and gales were frequently produced in the Lake region. 22nd, by midnight the pressure was highest over the Upper Lakes, with high northwesterly winds and gales thence east and southeastward to the Atlantic coast. 23rd, the pressure was above the normal from the Upper Mississippi valley and Lakes to Virginia, with cool, clear weather, and highest in the Lake region. 24th, it disappeared off the Middle Atlantic coast.

No. VI.—26th, it appeared in the extreme Northwest. 27th, advanced eastward over the Lake region. 28th, a. m. barometer at Alpena 30.15 in., or 0.20 above normal. During the day it extended toward southern New England. 29th, passed to the New England coast and the eastern British Provinces. 30th, a. m. barometer at Chatham 0.28 above normal, after which it slowly passed to the eastward.

*Areas of Low Barometer.*—As shown on chart No. I, eleven have been sufficiently well marked to be charted and described. Nos. VIII and IX were particularly extensive and destructive, having been accompanied by violent thunder-storms in many sections.

No. I.—This disturbance developed from the storm described in the June REVIEW as No. X. 1st, in the afternoon it appeared as an extensive barometric trough, reaching from the Eastern Gulf coast northward over Lake Huron into Canada, with the lowest pressure over Indiana and Ohio; p. m. barometers at Cincinnati and Columbus, Ohio, 29.79 in. Threatening and rainy weather prevailed from the Upper Lakes to the Gulf and South Atlantic States, with frequent thunder-storms and occasionally high winds. 2nd, the central pressure rose somewhat. Frequent light rains fell from Lakes Huron and Erie to the Gulf and South Atlantic States, with occasional thunder-storms and high winds. 3rd, it was dissipated by area of high pressure No. I, which succeeded it, but with the same conditions over the same area as on the previous day. 4th, in a slight barometric trough, which extended from southern New England to western Pennsylvania, heavy and destructive thunder-storms occurred, with large hail in latter. At Pittsburg, 3 to 5 p. m., heavy thunder-storm passed from southwest to northeast up the Alleghany valley; maximum velocity of wind, thirty miles per hour at 3.30 p. m.; total rainfall, 2.80 inches; several buildings swept away, houses flooded, &c; eight miles up the valley, at Ross Grove, large maple trees were uprooted, killing seven and injuring eighteen persons; on Sandy creek, twelve miles up the valley, a house was swept away, drowning five inmates. Not any signals were displayed or needed. The following maximum hourly velocities were recorded in the interior: Cairo, E. 30; Fort Sill, N. 36; St. Louis, N. 25 miles.

No. II.—1st, frequent rains, easterly winds and diminishing pressure in Florida indicated the advance of this storm. 2nd, the pressure reached its minimum; p. m. barometer at Punta Rasa 29.77 in., or 0.30

below normal. Threatening and rainy weather continued in Florida, with frequent gales, and extended to South Carolina. 3rd, easterly gales and rainy weather prevailed along the South Atlantic coast from Cape Hatteras southward. Signals were ordered to be displayed, morning of the 2nd, at Key West and St Mark's; 3rd, thence north along the coast to Cape Hatteras. Excepting St. Mark's and Jacksonville, they were justified. Maximum velocities: Key West, W. 36; Tybee Island, E. 37; Charleston, E. 36; Smithville, E. 38; Cape Lookout, SE. 36 miles.

No. III.—The barometer, which had been falling along the Pacific coast for two days previous, reached its lowest point during the morning of the 1st; a. m. barometer at San Francisco 0.22 below normal, and a high westerly wind in the afternoon. Light rains fell in Washington Ty., and northern Oregon. 2nd, it advanced toward the Rocky Mountain region. High winds or gales prevailed from the northern half of California to Colorado, Dakota and western Nebraska; light rains in Washington Ty., and Oregon. 3rd, the pressure fell to its minimum in Utah and Montana; p. m. barometer at Salt Lake City 0.38 and at Virginia City 0.41 below the normals. High winds and gales continued over the same area as the previous day, and in western Minnesota. The rain-area extended eastward to Montana Ty., 4th, the central pressure increased, but high winds and gales were frequent from Nevada to Colorado, western Nebraska and Dakota. 5th, it disappeared apparently to the northward, with continued high southerly winds and gales from Colorado and western Nebraska northward. Maximum velocities: San Francisco, W. 32; Winnemucca, SW. 40; Pioche, S. 33; Salt Lake City, NW. 44; Denver, SE. and NW. 36; North Platte, S. 54; Bismarck, SE. 48; Breckenridge, SE. 36 miles.

No. IV.—It is quite possible that this is a continuation of the storm just described, and was forced to take a northerly course by the high pressure area in its front and covering the Lake region. 6th, occasional rains fell in the Northwest, with high southerly winds, and frequent rains in the Southwest. 7th, it disappeared into Canada. Occasional rains prevailed from the Northwest and Upper Lakes to the Ohio valley, with thunder-storms at places. 8th, as the central depression progressed eastward to the north of the limit of the stations, frequent rains, with thunder-storms, resulted over the northern half of the country; at Grand Island, Neb., a destructive wind-storm; at Nashville, a very heavy thunder-storm. 9th, the centre disappeared to the northeastward of the St. Lawrence valley. Frequent rains, thunder-storms and high winds accompanied it as far south as the Middle States. Signals were displayed the 10th along the New Jersey and North Carolina coasts, but too late, and the former were not justified. Maximum velocities: Dodge City, S. 40; North Platte, NW. 60; Bismarck, W. 36; Pembina, S. 30; Stockton, Texas, SE. 35; Knoxville, SW. 28; Grand Haven, SW. 48; Port Huron, NE. 30; Kittyhawk, SW. 30; Cape May, E. 30; Sandy Hook, W. 32; Boston, SW. 30; Mt. Washington, W. 48 miles.

No. V.—As shown on the chart, this storm was formed by the union of two disturbances. 9th, the midnight barometer, at Portland, Or., fell to 0.25 below the normal. High southwest winds prevailed at San Francisco, and Fillmore, Utah; at Kit Carson, Col., a heavy wind, rain and hail-storm; heavy hail-storm east of North Platte; heavy and destructive thunder-storms in the eastern portion of Nebraska at night. 10th, the rain-area extended to Lake Michigan, with frequently high winds; in Columbus Co., Wis., heavy hail. 11th, threatening and rainy weather, with thunder-storms, prevailed over the Lake region, the Northwest, Wyoming, Colorado, New Mexico and Arizona. In Iowa, Wisconsin and northwestern Illinois much destruction was caused by floods. At Dubuque, Iowa, midnight to 5:15 a. m., severe thunder-storm; numerous houses, barns, &c., struck by lightning; country in vicinity of Centralia (ten miles west) flooded for miles around; railroad bridges damaged and all trains delayed from two to twelve hours. At Tucson, Arizona Ty., 4:45 to 6:30 p. m., heavy thunder and rain-storm; 4:45 p. m., lowest barometric reading this year; total rain-fall 5.10 inches; damage to town estimated at from \$25,000 to \$40,000; buildings completely ruined; west of town one vast lake; the Arroyos, north of town, resembled huge rivers. Throughout Arizona Ty., from 12th to 14th, very heavy thunder-storms, accompanied by heavy rains and waterspouts; houses unroofed and fences blown down. At Aqua Fria, twenty-seven telegraph poles reduced to fragments. At Phoenix, office struck and portion of battery destroyed. 12th, although the movement of the central depression could not be traced, a barometric trough formed eastward to the Middle States, in which unusually severe and destructive rain and thunder-storms occurred. Not any signals were ordered. Maximum velocities: San Francisco, SW. 28; Salt Lake City, SW. 28; Cheyenne, NW. 32; Denver, S. and NW. 36; Stockton, Texas, SE. 40; North Platte, S. 48; Breckenridge, SE. 36; Cape May, S. 44; Atlantic City, E. 43; Barnegat, NE. 32 miles.

No. VI.—14th, the pressure having rapidly diminished during the preceding night, this storm was central near to and west of Quebec in the morning, with rainy weather in the Lower St. Lawrence valley, and a southeast gale, veering to northeast, at Father Point. During the day and night the rain-area extended to New England and Nova Scotia. 15th, it disappeared beyond Nova Scotia. Signals were displayed at Eastport, but not justified. Maximum velocities: Mt. Washington, NW., 60; Father Point, NE., 43 miles.

No. VII.—14th, rapidly diminishing pressure, increasing southeasterly winds and rain-areas from Montana to the Upper Mississippi valley indicated the approach of a storm. During the night a heavy rain-storm at Dubuque flooded the surrounding country. 15th, frequent gales, mostly southerly, and occasional rains prevailed from Utah and Colorado to Manitoba, Minnesota and Wisconsin, with a continued fall in the barometer; p. m. barometer at Bismarck 0.51 below normal. 16th, two distinct depressions developed, one passing into Canada and north of Lake Superior, the other advancing southeastward to Iowa. Frequent rains and thunder-storms accompanied them from the Northwest and Upper Lakes southwestward



to Arizona and New Mexico, with high wind and gales at places. 17th, the southern branch gradually disappeared, after having produced heavy thunder-storms from the Northwest to Indian Territory. The northern branch took a southeasterly course toward New England, with frequent rains and thunder-storms from northeastern New York north and eastward. 18th, as the centre moved toward Nova Scotia, light rains were frequent from the Lower Lake region eastward, with thunder-storms, which were reported as violent and destructive at places in New York. 19th, a. m. barometer at Sydney, Cape Breton, 29.56 in., or 0.40 below normal, after which the centre disappeared northeastward. Cautionary Signals were ordered for the eastern New England coast on the afternoon of the 17th, but reported as not justified. Warnings were sent at the same time to Toronto for the Canadian stations in the provinces of Quebec, New Brunswick, Nova Scotia, Cape Breton and Newfoundland. Maximum velocities: Denver, SE. 36; Dodge City, S. 40; North Platte, S. 48; Bismarck and St. Paul, E. 36; Duluth, SW. 32; Sandusky, SW. 35; Cape Lookout, SW. 30; Morgantown, S. 43; Mt. Washington, W. 75 miles.

No. VIII.—16th, frequent light rains fell in Oregon and Washington Territory, with falling barometer. High westerly winds prevailed at San Francisco, and southwest gales in northern Nevada. At Olympia, p. m. barometer 29.67 in., or 0.29 below normal. By midnight it was probably central in northwestern Montana. 17th, it advanced into eastern Montana, followed by clearing weather in Oregon, Washington Territory and Idaho. 18th, the centre moved into the Red River of the North valley, producing high winds or gales and thunder-storms from thence to Kansas. 19th, although the main depression was north of Lake Superior, a barometric trough extended southwestward toward New Mexico, in which thunder-storms were frequent. 20th, light rains and high winds were occasionally reported from the Northwest, Lakes and St. Lawrence valley to the South Atlantic and East Gulf States. 21st, the storm centre took a southeastward course into Maine; midnight barometer at Portland 29.42 in., or 0.53 below normal. At New Orleans and Knoxville, heavy thunder-storms prevailed; along the North Carolina coast, southwest gales. From the northern portion of the Middle States and New England to the Provinces of Quebec, New Brunswick and Nova Scotia, heavy rains, gales and destructive thunder and hail-storms were frequent, with much damage to crops, buildings, trees, railroads, &c. At Northampton, Mass., a tornado; Napanee, Ontario, hurricane. At North Albany, N. Y., "about 1:20 p. m., most terrific cyclone, lasting ten seconds, leaving desolation and ruin; unroofed and destroyed sixteen buildings, &c."; observers saw "two storms approach in nearly opposite directions, one from the northeast, accompanied by a heavy black cloud, moving swiftly, and another from a point a little south of west; the two met in the vicinity at West Albany, where the cyclone apparently formed." The Signal service observer, ( $\frac{1}{2}$  mile south of storm,) observed "a funnel-shaped cloud moving rapidly from the west, too high to do much damage until it reached North Albany, when it seemed to come to the earth's surface; it moved with such velocity that every thing was carried in an easterly direction regardless of its whirling motion"; at the station a velocity of seventy miles per hour was registered for a few minutes, from the west. Boston and vicinity, Mass., 4:30 to 6:30 p. m., "severe thunder-storm, doing considerable damage north of city; numerous buildings and trees were struck in Cambridge, Lexington, Charlestown, Chelsea, Newton, Malden and Medford; a violent wind was reported at Winthrop, and a yacht was overturned off Rainsford Island, drowning one person; near Salem, tents were blown down and buildings unroofed." Over the Lakes northwesterly gales were also frequent. 22nd, p. m. barometer at Eastport 29.26 in., or 0.65 below normal. Light rains continued from the northern portions of New York and New England northeastward; high northwesterly winds and gales from the Lower Lakes and North Carolina to the Gulf of St. Lawrence. 23rd, the storm disappeared eastward, with diminishing winds along the Atlantic coast. Cautionary Signals were ordered on the morning of the 21st for the eastern New England coast, and reported as justified from a few stations only. The same morning warnings were sent to Toronto for the stations in the provinces of Quebec, New Brunswick, Nova Scotia, Cape Breton and New Foundland. On the 22nd, Off-shore Signals were displayed along the North Carolina and eastern New England coasts, but were ordered too late. Maximum velocities: San Francisco, W. 28; Winnemucca, SW. 34; Denver, NW. 36; North Platte, NW. 60; Breckenridge, S. 32; Escanaba, N. 29; Grand Haven and Saugeen, NW. 38; Sandusky, N. 36; Cape Lookout, SW. 45; Cape May, NW. 38; Sandy Hook, NW. 41; Boston, W. 30; Mt. Washington, NW. 62; Father Point, NE. 55 miles.

No. IX.—23rd, this storm began developing in the country between the Missouri valley and California. In Nevada and Utah thunder-storms were frequent, and southerly gales in Colorado and western Nebraska. 24th, the centre passed into Nebraska, with rain from Indian Territory and the Northwest to Montana; midnight barometer at Omaha 0.16 below normal. 25th, the central pressure diminished; midnight barometer at Keokuk 29.45 in., or 0.44 below normal. The rain-area reached from the Lake region to Montana, Wyoming, Colorado and Indian Territory, and was heavy in Iowa and Illinois. 26th, its movement northeastward was very rapid, with a continued diminution of the pressure at its centre; midnight, barometer at Burlington 29.28, or 0.64 below normal. From Indian Territory and Tennessee northeastward to Lake Huron, the St. Lawrence valley and New England, rainy weather, gales and destructive thunder-storms were frequent. At Chicago a heavy northeast wind-storm, followed at night by heavy rain—over four inches in about seven hours—flooding cellars and causing damage estimated at \$100,000; southwestern portion of city under water. On Lake Michigan the storm was quite severe. "At 5:30 p. m. a tornado developed two or three miles west of South Hartford, Washington Co., N. Y., in which position dark, heavy clouds, from east and north, were observed to meet; it then moved northeastward, with a terrific noise, over the northern part of Hartford village, passed to the southwest of Middle

Granville, and thence across the State line into Vermont, when it appeared to divide; barns, trees, fences, &c., were entirely demolished, and, as it passed over 'Martin Pond' and Meltowe river, large quantities of water were scooped up and carried some distance; it travelled about fourteen miles in an almost straight line; was about five rods in width, and passed any one point in about fifty seconds." 27th, it disappeared over the Gulf of St. Lawrence, producing gales from thence southwestward to the North Carolina coast. In northern Texas very heavy rains fell, accompanying thunder-storms, on this day and the following day. Cautionary Signals were ordered for Lake Michigan stations on the 25th; for those along Lakes Huron, Erie and Ontario and the coast from North Carolina to Maine, the 26th; and were very generally justified. Warnings were also sent to Toronto for the Canadian stations in the provinces of Quebec, New Brunswick, Nova Scotia, Cape Breton and Newfoundland. Maximum velocities: Salt Lake City, NE. 28; Denver, S. 36; Dodge City, W. 40; St. Louis, S. 40; North Platte, NE. 36; Chicago, NE. 25; Cleveland, SE. 45; Oswego, S. 25; Cape Lookout, SW. 40; Cape Henry, SW. 32; Cape May, S. 44; Barnegat and Sandy Hook, SW. 32; New London, SW. 30; Wood's Holl, SW. 38; Portland, NW. 36; Eastport, S. 35; Mt. Washington, NW. 100 miles.

No. X.—28th, the pressure diminished in the Northwest, with frequent rains. 29th, a barometric trough formed toward the Ohio valley. Thunder-storms were occasionally reported from the Gulf and South Atlantic States, and frequent rains from thence northward to the Middle States and Lower Lake region; occasionally high winds from the coast. By midnight it had developed into a slight depression, which was central in Ohio. 30th, it moved into the Middle States, where it was dissipated on the following day. The Cautionary Signals displayed the 30th from North Carolina to Massachusetts were ordered rather late. Maximum velocities: Shreveport, S. 32; St. Mark's, S. 28; Cape Lookout, SW. 40; Cape Hatteras, SW. 34; New London, E. 26; Boston, E. 30; Mt. Washington, SE. 50 miles.

No. XI.—29th, it advanced eastward toward the Northwest, producing high winds, and in Dakota and western Minnesota thunder-storms. 30th, the centre apparently passed over the northern portion of Minnesota, with frequent rains in the Northwest and Wisconsin. In Carver, Rice and Dakota counties, Minn., severe hail-storms, doing much damage; track ten to twelve miles wide, traveling from northwest to southeast. Wadena county, Minn., great damage to crops from heavy rain and wind storm. 31st, occasional rains, thunder-storms and gales were reported from the Lake region to the Northwest, and large hail from Independence, Iowa. Not any signals were displayed, and would have been justified at only two Lake stations. Maximum velocities: North Platte, S. 36; Bismarek, W. 26; Breckenridge, SE. 37; Leavenworth, NW. 28; St. Louis, E. 30; Davenport, SW. 50; Milwaukee, W. 28; Sandusky, SW. 27 miles.

## INTERNATIONAL METEOROLOGY.

*April 8th, off Cape Horn, very heavy weather, seas swept decks.*

*May 5th, 77° S., 86° W., ship Royal Dane encountered gale lasting seven days. U. S. Flagship Hartford, at Montevideo, reports, 8th, night, barometer 29.57 inches; NW. and W. fresh, heavy rain-squalls, thunder and lightning; 9th, a. m. barometer 29.55, strong W. and WSW. gales; 12th, evening, barometer 29.64, W. fresh, increasing to moderate WSW. gale, rain-squalls, thunder and lightning; 13th, 1 to 2 p. m., barometer 29.50, heavy WSW. gale, blowing heaviest from 2 to 7 p. m., with rising pressure; 14th, heavy SW. gale; 15th, moderate S. by W. gale. 18th, 34° 46' N., 60° 11' W., (by dead reckoning,) 8 a. m., WNW. gale and heavy sea. 22d, Pacific Mail S. S. City of Peking, reports, at Hong Kong, from a little before midnight of the 21st to 2:30 a. m. of 22d, severe thunder-storms, with very heavy rain, doing serious damage to roads, buildings, &c., by rush of water down hill-side, and considerable loss of life by rise in creek where boats were moored for the night. 25th, 42° S., 100° W., heavy SE. gale, lasting twenty-four hours. 26th, off Cape of Good Hope, heavy westerly gales.*

*June 7th, 26° 30' N., 55° 20' W., high sea. 10th, 60° N., 20° W., heavy squall; 60° 34' N., 19° 30' W., (night of 10th and 11th,) severe squalls and heavy seas. 20th, U. S. Steamship Gettysburg at Ben Ghazi, N. Africa, reports heavy white squall, (force 8) from W. by N., lasting four minutes.*

*July 1st, 43° 29' N., 43° 50' W., fresh NW. gale and heavy W. sea. 2d, 48° 30' N., 35° 58' W., squally; 46° 14' N., 40° 14' W., WNW. gale, heavy W. sea. 3d, 48° 21' N., 33° 36' W., SW. strong breeze, high sea. 4th, 46° 40' N., 40° 54' W., increasing WNW. storm; 45° 54' N., 37° 41' W., fresh WNW. gale. 5th, 44° 47' N., 46° 01' W., westerly wind and sea decreasing; 49° 45' N., 24° 40' W., high WSW. sea; 50° 47' N., 26° 09' W., high W. sea; 17° 43' N., 101° 40' W., 6:30 to 8 p. m., thunder-storm, wind veering from NE. to SW., with gale from SE. at 7 p. m., heavy rain throughout watch, sea rough, barometer at 6 and 7 p. m. 29.49 in. 6th, 49° 43' N., 30° 45' W., high W. sea. 7th, 48° 55' N., 40° 18' W., heavy southerly gale, high sea, rain; 48° 16' N., 38° 15' W., moderate to fresh WNW., SW. and W. gale, and high westerly sea. 8th, 47° 46' N., 46° 42' W., heavy SW., WNW., gale, very high sea, squally; 47° 30' N., 30° 08' W., moderate westerly gale, heavy W. sea; 46° 42' N., 45° 29' W., fresh SW. gale, high W. sea. 10th 46° 16' N., 48° 18' W., heavy rain. 13th, ship Garelock, on July 3rd, lat. 23° N., long. 58° W., thence to Bermuda July 13th, reports had variable winds, squalls and frequent water-spouts. 20th, 44° 17' N., 55° 08' W., fresh SSE. gale; about 130 miles W. of St. John's, N'd, moderate gale and high sea; off the Banks, N'd, heavy NW. squall. 21st, 48° 38' N., 41° 47' W., fresh SW. to WSW. gales; 50° 02' N., 38° 39' W., strong SW. and W. wind, rough sea, ship pitching hard. 22nd, 46° 28' N., 47° 29' W., fresh W. gale; 49° 0' N., 42° 40' W., NW.*

strong gales, heavy squalls, high sea, and from noon to 4 p. m. three hurricane-like squalls; 52° 07' N., 32° 32' W., noon, moderate W. gale, midnight, fresh NW. gale. 23rd, 50° 22' N., 38° 30' W., moderate NW. gale; 48° 23' N., 23° 54' W., stormy, rain. 24th, 47° 31' N., 30° 47' W., stormy. 25th, 46° 02' N., 37° 45' W., stormy.

## TEMPERATURE OF THE AIR.

The isothermal lines on chart No. II illustrate the general distribution of the temperature of the air for the month. By a reference to the table upon the left side of the same chart it will be seen that the average for the month is slightly lower than usual for the Pacific coast. For all the other districts the average is higher, especially for the Lake region. To give an idea of the effect of the warm weather during the month, the following data, relative to sun-strokes, have been generally extracted from newspapers, and may not be strictly accurate: 1st, New York city, 1 case. 2nd, Oswego, N. Y., 1; Springfield, Mass., 1; New York city, 10. 3rd, Boston, 7, 5 fatal; New York city, 12, 1 fatal. 4th, New York city, 5. 5th, Newport, R. I., several, 1 fatal; New York city, 15, 2 fatal. 8th, New York city, 2. 9th, St. Louis, 2 fatal. 10th, St. Louis, 2 fatal; New York city, 4. 11th, St. Louis, 3 fatal; New York city, 2, 1 fatal. 12th, Cincinnati, 6, 2 fatal; St. Louis, 20, 4 fatal. 13th, Little Rock, Ark., 1 fatal; Ellston, Mo., 1 fatal; St. Louis, about 30, 16 fatal; Burlington, Iowa, 2 fatal. 14th, Dubuque, Iowa, 2; Little Rock, 2 fatal; Quincy, Ill., 7, 5 fatal; St. Louis, 41 fatal. 15th, Kirkwood, Mo., East St. Louis, and Venice, Ill., numerous; St. Paul, St. Joseph, Mo., Naples, Ill., and Chicago, 1 fatal; Omaha, many, 3 fatal; Leavenworth, 14, 6 fatal; Peoria, Ill., 2 fatal; Bloomington, Ill., 24, 4 fatal; Marquette, several; St. Louis, hundreds, 49 fatal; Nashville, numerous, 2 fatal; New York city, 2. 16th, Memphis, 1 fatal; St. Louis, 35 fatal; Dubuque, 3; DeWitt, Iowa, 2 fatal; Galesburg, Ill., several fatal; Chicago, 9 fatal; Milwaukee, 20, 3 fatal. 17th, Ottumwa, Iowa, 4, 1 fatal; St. Louis, numerous, 8 fatal; Milwaukee, 103, 9 fatal; Chicago, 59, 20 fatal; Grand Rapids, Mich., Rochester and Louisville, several; Cincinnati and Columbus, Ohio, 3; Detroit, numerous, several fatal; Wheeling, W. Va., 2 fatal; Pittsburg and Buffalo, 1 fatal; Toronto, large number. 18th, cases were frequent from the New England and Middle States westward to Missouri and Iowa; 21 fatal in St. Louis, 3 in Terre Haute and Indianapolis, Ind., 2 in Cincinnati, and 1 in Baltimore, Pittsburg and Philadelphia. 19th, frequent as on previous day, but more numerous in the Eastern States; from 1 to 3 fatal cases in many towns and cities. 20th, Memphis, 1 fatal; St. Louis, 5 fatal; Cincinnati, 3 fatal; in the Middle Atlantic and New England States, from 1 to 4 cases fatal in the larger cities. 21st, Memphis, 3 fatal; New York city, 4 fatal. 22nd, 3 fatal at Memphis. 24th, Bismarck, 1 fatal. For St. Louis, the total number of deaths reported as from sun-stroke is 163. At Iowa City, Iowa, 12th sun thermometer rose to 156°; for fifteen days the temperature in the shade rose above 86°. Ft. Yuma, Arizona Ter., the mean of the daily minima temperatures for the month is 77°; of the daily maxima temperatures, 109°. At Memphis, between 4 and 5 a. m., 22nd, temperature began decreasing rapidly; the past eleven days have been fearful, causing numerous deaths and a partial suspension of business.

*Minimum and Maximum Temperatures, respectively:* Maine—at Eastport, 47° and 83°; Portland, 55°, 96°; Orono, 51°, 93°. New Hampshire—Mt. Washington, 35°, 68°; Dunbarton, 55°, 98°; Auburn, 50°, 98°. Vermont—Burlington, 53°, 96°; Woodstock, 45°, 97°. Massachusetts—Boston, 54°, 98°; Somerset, 56°, 102°; Waltham, 46°, 96°. Rhode Island—Newport, 56°, 92°; Fort Adams, 54°, 91°. Connecticut—New Haven, 55°, 92°; Colebrook, 50°, 92°. New York—Albany, 54°, 92°; New York city, 61°, 94°; Oswego, 59°, 100°; West Point, 52°, 101°; Plattsburg B'ks, 49°, 92°; Buffalo, 56°, 90°. New Jersey—Atlantic City, 61°, 87°; Linden, 63°, 99°; Cape May, 66°, 90°. Pennsylvania—Philadelphia, 64°, 97°; Pittsburg, 57°, 101°; Tioga, 50°, 100°; Chambersburg, 62°, 99°. Delaware—Dover, 70°, 95°. Maryland—Baltimore, 65°, 98°; New Market, 67°, 100°; Cumberland, 60°, 92°. District of Columbia—Washington, 63°, 98°. Virginia—Norfolk, 66°, 101°; Lynchburg, 60°, 97°; Snowville, 51°, 99°. West Virginia—Morgantown, 56°, 95°; Helvetia, 48°, 93°. North Carolina—Wilmington, 66°, 97°; Cape Hatteras, 68°, 84°; Weldon, 70°, 104°; Asheville, 59°, 90°. South Carolina—Charleston, 73°, 95°; Spartanburg, 70°, 98°. Georgia—Augusta, 71°, 105°; Gainesville, 68°, 101°; Tybee Island, 71°, 98°. Florida—Jacksonville, 72°, 97°; Key West, 73°, 93°; Ft. Barrancas, 73°, 102°. Alabama—Montgomery, 73°, 100°; Mobile, 72°, 98°. Mississippi—Vicksburg, 71°, 100°. Louisiana—New Orleans, 75°, 93°; Shreveport, 71°, 98°. Texas—Clarksville, 73°, 101°; Galveston, 73°, 95°; San Antonio, 58°, 99°; Corsicana, 67°, 102°; Concho, 66°, 102°; Stockton, 56°, 105°; Eagle Pass, 65°, 101°. Tennessee—Memphis, 69°, 97°; Knoxville, 65°, 97°; near Cleveland, 70°, 99°. Kentucky—Louisville, 64°, 97°. Ohio—Cincinnati, 65°, 96°; Cleveland, 57°, 96°; Westerville, 50°, 95°; Jacksonburg, 63°, 100°. Indiana—Indianapolis, 58°, 96°; Vevay, 55°, 97°; New Corydon, 64°, 100°. Illinois—Cairo, 66°, 96°; Chicago, 59°, 97°; Hennepin, 63°, 102°; Riley, 54°, 95°. Arkansas—Judsonia, 73°, 96°; Mt. Ida, 72°, 94°. Missouri—St. Louis, 64°, 98°; Wet Glaze, 60°, 100°; Lebanon, 60°, 95°; Oregon, 58°, 94°. Indian Territory—St. Sill, 61°, 98°; Ft. Gibson, 62°, 99°. Kansas—Leavenworth, 61°, 100°; Dodge City, 64°, 102°; Fort Wallace, 62°, 106°; Fort Hays, 50°, 99°. Michigan—Detroit, 56°, 100°; Alpena, 49°, 90°; Grand Rapids, 60°, 97°; Marquette, 45°, 100°. Wisconsin—Milwaukee, 56°, 95°; Embarrass, 58°, 98°; Neillsville, 42°, 94°. Iowa—Dubuque, 55°, 96°; Tabor, 66°, 100°; Boonsboro, 62°, 104°; Nora Springs, 52°, 99°. Minnesota—St. Paul, 57°, 96°; Breckenridge, 49°, 97°. Nebraska—Omaha, 57°, 96°; Fort McPherson, 46°, 100°. Dakota—Yankton, 56°, 94°; Pembina, 45°, 89°; Bismarck, 47°, 100°; Fort Rice, 44°, 103°; Olivet, 55°, 104°. Colorado—Denver, 54°, 100°; Summit, 37°, 72°; Fort Lyon, 53°, 108°. Wyoming Territory—Cheyenne, 44°, 92°; Fort Sanders, 38°, 88°. New Mexico—Santa Fe, 50°, 95°. Utah—Salt Lake City,



52°, 96°; Coalville, 50°, 91°. *Nevada*—Pioche, 51°, 98°; Winnemucca, 37°, 97°; Fort McDermit, 41°, 101°. *Idaho*—Boise City, 46°, 97°. *Oregon*—Portland, 49°, 85°; Roseburg, 48°, 84°. *California*—Alcatraz Island, 47°, 69°; Fresno, 58°, 117°; Red Bluff, 54°, 105°; Campo, 35°, 102°; San Francisco, 51°, 73°; San Diego, 56°, 77°. *Arizona*—Yuma, 70°, 118°. *Montana*—Virginia City, 42°, 92°.

*Ranges of Temperature.*—The monthly ranges will generally appear from an examination of the above minima and maxima temperatures. The greatest daily ranges vary as follows: in New England from 19° at Wood's Holl to 33° at Burlington; Middle Atlantic States, 17° at Cape May to 28° at Lynchburg; South Atlantic States, 12° at Cape Lookout to 27° at Augusta; Gulf States, 14° at Key West to 22° at Montgomery, 27° at Corsicana and 35° at Camp Stockton; Ohio valley and Tennessee, 19° at Cairo to 33° at Pittsburgh; Lower Lake region 21° at Erie to 31° at Oswego; Upper Lake region, 20° at Milwaukee to 36° at Marquette; Upper Mississippi valley, 19° at Davenport to 26° at Dubuque; Red River of the North valley, 33° at Pembina to 36° at Breckenridge; Missouri valley, 25° at Yankton to 33° at Bismarck; Plains of Nebraska and Kansas, 31° at North Platte to 35° at Dodge City; Rocky Mountain stations, 30° at Santa Fe to 39° at Cheyenne and Virginia City; Utah, 40° at Salt Lake City; Idaho, 38° at Boise City; Nevada, 35° at Pioche to 49° at Winnemucca; California, 17° at San Diego to 21° at San Francisco, 35° at Sacramento and 58° at Campo; Oregon, 30° at Portland to 36° at Roseburg; Arizona, 40° at Yuma.

*Frosts.*—Coalville, Utah, on the 11th, slightly injured potato vines.

## PRECIPITATION.

On chart No. III is illustrated the general distribution of the rain-fall for the month. On the left side of the same chart will be found a table giving the average precipitation for July by districts. For the Eastern Gulf States, the deficiency has been quite large. There have been decided excesses in the St. Lawrence valley, Tennessee and Lower Lake region.

*Special Heavy Rains.*—1st, Louisville, Ill., 5.00 in. in two hours. 1st and 2nd, New Harmony, Ind., 4.22 in. 4th, Pittsburgh, Pa., 2.80 in. in about two hours. 7th and 8th, Bellefontaine, Ohio, 3.00 in. 8th, Nashville, Tenn., 3.05 in. in 80 min. 9th and 10th, Plattsmouth, Neb., 4.81 in. 10th, Logan, Ia., 8.00 in. Buffalo, N. Y., 1.00 in. in 30 min. 10th and 11th, Beloit, Wis., 5.25 in.; Madison, Wis., 3.82 in. 11th, Tucson, Ariz., 5.10 in. in about one hour. 11th and 12th, New Corydon, Ind., 5.05 in. Riley, Ill., 4.26 in. 13th, Campo, Cal., 2.32 in. in 95 min., only rain-fall at station during month; Cape Hatteras, N. C., 2.10 in. in 90 min. 14th, Charleston, S. C., 5.14 in. in 3½ hours; Cape Lookout, N. C., 1.26 in. in 65 min. 19th, Sandy Spring, Md., 2.00 in. in one hour. 21st, New Orleans, La., 2.63 in. 21st and 22nd, Mt. Washington, N. H., 4.24 in. 22nd, San Antonio, Tex., 2.20 in. in 75 min. 22nd and 23rd, Morriston, Dak., 8.00 in. 23rd and 24th, Manhattan, Kan., 8.00 in. 26th, Hudson, Ohio, 3.00 in.; Chicago, Ill., 4.14 in.; Ruggles, Ohio, 3.20 in. 27th, Denison, Tex., 6.62 in. in two heavy storms; Coleman, Tex., 2.98 in.; Graham, Tex., 3.44 in. 27th to 29th, Fort Griffin, Tex., 6.68 in.; Decatur, Tex., 6.14 in. 28th and 29th, Wytheville, Va., 4.40 in. 29th, New Corydon, Ind., 3.71 in.; Corsicana, Tex., 2.27 in.; St. Meinrad, Ind., 5.30 in. 29th and 30th, Washington, D. C., 5.93 in., (over one inch fell from 12.30 to 1.30 p. m. of the 30th.); Fort Whipple, Va., 4.71 in. 30th, Barnegat, N. J., 3.42 in.; Accotink, Va., 3.50 in. 31st, Detroit, Mich., 2.48 in.; Cape Lookout, N. C., 1.80 in. in 60 min.; Phoenix, Arizona, 2.22 in., heaviest ever recorded.

*Largest Monthly Rain-falls.*—New Corydon, Ind., 14.71 inches; Logan, Iowa, 13.00 in.; Manhattan, Kan., 12.71 in.; St. Meinrad, Ind., 12.35 in.; Charleston, 12.10 in.; Emerson, Neb., 11.61 in.; Mount Washington, N. H., 11.00 in.; Cresco, Iowa, 10.92 in.; Taboe, Iowa, 10.46 in.; Morriston, Dak., 10.20 in.; Denison, Tex., 9.95 in.; Bellefontaine, Ohio, 9.78 in.; Punta Rasa, 9.58 in.; Nashville, 9.43 in.; Hudson, Ohio, 9.30 in.; Henrietta, Tex., 9.13 in.

*Smallest Monthly Rain-falls.*—At Healdsburg, San Francisco, Sacramento, Monterey, Fresno, Visalia, Santa Barbara, Los Angeles and San Diego, Cal., Fort McDermit and Hamilton, Nev., and Camp Apache, Arizona, none; Red Bluff, Cal., light sprinkle; Burkes, Arizona, 0.03 in.; Wickenburg, Ariz., 0.09 in.; Hermosa, Col., 0.13 in.; Austin, Nev., 0.15 in.; Florence, Arizona, 0.21 in.; Yreka, Cal., and Boise City, Idaho, 0.31 in.; Pioche, Nev., 0.29 in.; Austin, Tex., and near Forsythe, Ga., 0.32 in. The observer at Dubuque reports that at Gangowen, twenty miles south of Dubuque, no rain has fallen since latter part of June.

*Floods.*—2d and 3d, Missouri Pacific railroad track 18 inches under water between Leavenworth and Kansas city; crops in low lands washed out and destroyed. 3d, at Atchinson, Kan., higher than for twelve years past, great damage along banks; at St. Josephs, Mo., higher than since 1844, considerable damage to railroad bridge, east abutment sunk eight to ten feet by current washing foundations. 4th, Sandy creek and portions of low-lands in Alleghany valley inundated, house swept away and five persons drowned; wash-outs on W. Pa. and Alleghany valley railroads. 9th, Rapid City, forty miles north of Deadwood, Dakota, p. m., water spout, rising river 15 feet in 1½ hour, deluging farms, carrying away bridges, two men drowned, and much damage done to freight trains. 10th, near Russell's station, Ohio, 500 feet of railroad track and bridges swept away. 11th, on Illinois Central railroad, near Seven Miles, 500 feet of track and three or four bridges washed away; Geneva Lake, Wis., rose 20 inches in eight hours, (unknown before,) flooding Kay's Park, Russells, &c.; at Genoa Junction, mill-dam carried away; along Maquoketa and Turkey rivers, Iowa, streams generally three feet higher than before recorded, doing much damage; at McGregor, Iowa, Mississippi river rose three feet, trains suspended by washcuts, street waist deep. 12th, in Green, Sauk, Dane, Columbia, Rock

and Crawford counties, Wis., land badly washed and some crops lodged beyond recovery; in Kosciusko and Allen counties, northern Indiana, streams high, country flooded; in Auglaise valley, Ohio, destructive floods. 15th, Illinois Central railroad, two bridges carried away in northern Illinois. Neillsville, Wis., 20th, the recent rains made a 6 foot rise in Black river, logs running good. 21st, New Orleans, streets flooded 3 to 4 feet deep. 22nd, Silver Lake, Dak., forty miles north of Yankton, cloudburst, submerging country and drowning seven persons; west branch of Vermillion river spread out to a width of over one mile, and 10 to 30 feet deep. 28th, Missisquoi and other streams near Richford, Vt., much swollen; southwestern railroad track badly washed; trains delayed.

*Drought.*—Gainesville, Ga., severe drought from 6th to 27th; no rain; crops half destroyed. Somerset, Mass., very severe and injurious. Frankford, Mo., no rain of any amount has fallen within eighteen miles of this station; vegetation seriously injured by drought; early corn entirely cut short, later crops much damaged and some completely ruined. Greenville, N. C., month very dry; no rain from the 4th to 28th. Near Cleaveland, Tenn., vegetation suffering severely for want of rain; 21st, severe drought, everything drying up; 26th, very dry, vegetation parched; 27th, hottest and driest weather ever seen in the state. Wytheville, Va., 13th, drought fairly commenced; corn in fields curling and suffering; garden vegetables suffering still more; flowers entirely destroyed in large numbers where watering was impossible; no rain from 1st to 17th. Crops on Long Island suffering from drought, 7th. Dorchester Co., Md., rain much needed, pastures failing, corn suffering, 19th.

*Hail.*—Ft. Wallace, Kan., 28th; Camp Sheridan, Neb., 7th; Ft. Sanders, Wy. Ter., 6th, 10th; Summit, Col., 5th, 11th, 13th, 16th, 21st, 25th, 27th; Byron, Ia., 31st; Vail, Ia., 10th; Independence, Ia., 31st; Tabor, Ia., 25th, 28th, 30th, 31st; Sandy Springs, Md., 31st; Amherst, Mass., 21st; Fall River, Mass., 21st; De Soto, Neb., 31st; Clear Creek, Neb., 10th; Near Genoa, Neb., 8th; Scarsdale, N. Y., 21st; Starkey, N. Y., 10th; South Hartford, N. Y., 16th, 21st, 26th; Near Chambersburg, Pa., 12th; Catawissa, Pa., 18th, 21st; Kit Carson, Col., 9th; Salt Lake City, Utah, 15th; Winnemucca, Nev., 23rd; Denver, Col., 28th; Cheyenne, Wy. Ty., 27th; Detroit, Mich., 31st; Charleston, S. C., 14th; Washington, D. C., 19th.

*Rainy Days.*—The number of days on which rain has fallen varies as follows: New England, 7 to 15; Middle States, 7 to 15; South Atlantic States, 8 to 15; Gulf States, 7 to 18; Ohio valley and Tennessee, 9 to 16; Lower Lake region, 9 to 18; Upper Lake region, 9 to 15; Upper Mississippi valley, 6 to 16; Lower Missouri valley, 6 to 14; Eastern slope, 5 to 16; Rocky Mountain stations, 7 to 18; Western plateau, 1 to 4; Pacific coast, 0 to 6.

*Cloudy Days.*—New England, 5 to 14; Middle States, 3 to 11; South Atlantic States, 3 to 9; Gulf States, 1 to 10; Ohio valley and Tennessee, 5 to 12; Lower Lake region, 5 to 11; Upper Lake region, 5 to 11; Upper Mississippi valley, 3 to 10; Lower Missouri valley, 7 to 10; Eastern slope, 3 to 7; Rocky Mountain stations, 0 to 5; Western plateau, 1 to 4; Pacific coast, 0 to 11.

*Snow.*—Summit, Col., 27th, snow fell thickly at the station, covering all the surrounding summits.

## RELATIVE HUMIDITY.

The average percentage of relative humidity for the month ranges as follows: New England, 62 to 83; Middle States, 62 to 84; South Atlantic States, 67 to 83; Gulf States, 65 to 81; Ohio valley and Tennessee, 63 to 72; Lower Lakes, 68 to 74; Upper Lakes, 66 to 77; Upper Mississippi valley, 63 to 75; Lower Missouri valley, 63 to 71; Eastern slope, 59 to 75; Western plateau, 13 to 34; Pacific coast, 32 to 78. High stations report as follows: Mt. Washington, 97.6; Virginia City, 36.9; Cheyenne, 52.1; Denver, 46.2; Colorado Springs, 54; Santa Fe, 40.4.

## WINDS.

The prevailing winds at the Signal Service stations are shown by the arrows, flying with the wind, on chart No. II. The *maximum* velocities, in miles per hour, have been given in the description of the movements of areas of low pressure. On Mt. Washington the highest velocity, NW. 100 miles, was recorded on the 27th.

*Total Movements of the Air.*—The following are the *largest* monthly movements recorded at the Signal Service stations, viz.: Mt. Washington, 17,600 miles; Cape Lookout, 12,940; North Platte, 10,569; Cape Hatteras, 10,296; Portsmouth, N. C., 10,226; Dodge City, 9,285; San Francisco, 9,183; Stockton, Tex., 8,862; Cape May, 8,692. The *smallest* are: Montgomery, 1,614 miles; Knoxville, 1,803; San Antonio, 2,092; Lynchburg, 2,180; Shreveport, 2,260; Visalia, 2,277; Nashville, 2,462; Dubuque, 2,626; Graham, Tex., 2,693; Roseburg, Or., 2,716; Vicksburg, 2,708. Lieut.-Commander Chas. H. Craven, U. S. Navy, observer at U. S. Navy Yard, Mare Island, Cal., remarks: "I think it worthy of special remark the following record of the average force of the winds of this first half of June. \* \* \* Average wind per hour is 17.42 miles. According to the oldest inhabitants it has been unprecedented. From 4:36 a. m., 11th to 12th, an average of 26.4 miles per hour. At 5 p. m., 6th, SW. 62 miles; at 5:30 p. m., 11th, SSW. 56 miles; at 9 p. m., 14th, WSW. 45 miles;" "also total movement of the wind for July, 13,548 miles."

*Local Storms.*—Rowe, Mass., 4th, heavy rain, doing considerable damage. Camp Sheridan, Neb., 7th, 4.07 to 4.16 p. m., severe thunder-storm from the east, with hail stones covering the ground like snow, largest



measuring seven inches in circumference and the smallest six; the heaviest weighed after the storm  $1\frac{1}{2}$  oz; 640 panes of glass broken at the post, chickens killed, corn and vegetables cut down. Boone Co., Iowa, 8th, storm of rain and hail, causing almost total destruction of crops. St. Thomas, West Indies, 9th and 10th, heavy rains, strong winds, almost a hurricane. Oregon, Mo., 9th, 4 a. m., strong gale from NW., with thunder and lightning, destroying crops, trees, buildings, &c. From 10th to 12th, severe rains in northeastern portion of Iowa, much damage to crops. Chambersburg, Pa., 12th, heavy storm of wind and rain; six miles southwest, very destructive hail-storm. During the night, (11th and 12th,) a severe NE. gale prevailed at the mouth of St. John's River, Fla.; Schr. Sarah R. Thomas broke loose at 11:30 p. m., and after crossing bar went ashore at daylight south of Mayport; at Mayport a very high sea prevailed during morning, and two pilot boats were landed high and dry. At St. Augustine, Fla., p. m. 11th to 7 a. m. 12th, NE. to SE. gale. At Abaco, Bahamas, evening 11th, NE. gale. 14th, Charleston, S. C., severe thunder and hail-storm from 1 p. m. to 2:15 p. m.; rainfall from 1 to 2 p. m. 4 in., and from 2 to 4:30 p. m. 1.13 in., total 5.13 in.; hail at 1:30 p. m. very heavy in low portion of city; wind constantly veering and backing between NE. and SW. by the SE.; max. vel., S. 42 at 1:40 p. m.; in Meeting street seven inches of rain is reported to have fallen in 15 minutes, and the streets in this portion of city were flooded over three feet deep; buildings, shipping, and trees were considerably damaged by wind and lightning. At Tybee Island, Ga., 14th, a heavy NE. gale prevailed from 4:15 to 5 p. m. Scarsdale, N. Y., 21st, severe gale, with hail, uprooting trees and destroying vegetation. Near Cleveland, Tenn., 31st, heavy wind-storm six miles north of station, peach orchards severely injured.

*Waterspouts.*—June 4th, Denver, Col., water-spout observed up Platte Canyon, about ten miles to the southwest; visible about ten minutes; most damage occurred in vicinity of Littleton; Platte river raised slightly and inundated a portion of railroad track. June 24th, Indianola, at 7:10 a. m., two large waterspouts were observed about three or four miles southeast of station, moving northward over the bay, at about twelve or fifteen miles per hour; they appeared about two or three miles apart; the columns were complete from surface of bay to the clouds and broke up respectively at 7:25 and 7:35 a. m. Mayport, Fla., July 24th, eight miles NE. of station; no progressive motion visible.

## VERIFICATIONS.

*Indications.*—As worked up and issued to the public three times daily, they have been carefully compared with the actual conditions during the succeeding twenty-four hours, with the following result:—the percentage verified averages 80.6 for New England; 77.8, Middle Atlantic States; 83.5, South Atlantic States; 89.8, Eastern Gulf States; 86.7, Western Gulf States; 81.6, Ohio Valley and Tennessee; 84.9, Lower Lake region; 83.1, Upper Lake region; 84.3, Upper Mississippi valley; 82.9, Lower Missouri valley. For all the districts the average verified is 83.7 per cent. By elements the percentage verified averages 86.1 for the weather; 86.8, wind-direction; 81.1, temperature; 80.9, barometer. There were 23 omissions to predict, (8 for weather, 4 for wind-direction, 5 for temperature and 6 for barometer,) out of 3,720, or 0.62 per cent. Of the predictions made, 3.0 per cent are recorded as having completely failed; 3.0 per cent, as one-fourth verified; 14.3 per cent, as one-half verified; 15.3 per cent, as three-fourths verified; 64.4 per cent, as fully verified.

*Cautionary Signals.*—During the month 88 Cautionary Signals were displayed; 67, or 76 per cent., were justified by subsequent hourly velocities of 25 miles or over, at or within 100 miles of the station. Two signals were ordered up late. Sixty-three cases were reported, generally from scattered stations, of winds of 25 miles or over when signals were not ordered.

## NAVIGATION.

*Stages of Water in Rivers.*—In the table, upon the right side of chart No. III, are given the highest and lowest readings of the Signal Service gauges for the month, with the dates. Generally, the changes in the rivers have been gradual and slight. The Cumberland rose three feet on the 2nd and 3rd at Nashville. The Ohio rose 3 feet 5 inches the 18th and 19th at Cincinnati. In the Lower Missouri and Lower Mississippi there has been almost a steady fall throughout the month. The Upper Mississippi rose nearly 4 feet at Dubuque from the 11th to the 13th; over 4 feet at Davenport from the 13th to the 16th; nearly 3 feet at Keokuk from the 14th to the 17th; over 3 feet at St. Louis on the 30th and 31st. At Omaha the channel of river changed during month towards Nebraska shore and is now between piers Nos. 3 and 5. Fort Gibson, 16th, steamer Big Rock arrived from Little Rock, being the first arrival in eight years. Shreveport, navigation good throughout month for largest class of boats. La Crosse, 13th, "water getting so low that navigation is exceedingly difficult." Dubuque, a good boating and rafting stage during month. Savannah river, at Augusta, Ga., 27th, lower than since 1876, forded by man on horseback.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—1st, Ill., Ind., Mich., Mo., Ohio, Tenn., Tex., Miss., Fla., Ga., S. C. 2nd, Tenn., Va., Ind., N. Y., Ohio, Ga., Va. 3rd, Me., Miss., N. Y., Montana, Mich., W. Va., Ga., Va., Me., Dak., Ohio, S. C. 4th, Conn., Kan., Mass., N. J., N. Y., Pa., Tex., Fla., La., Mo., W. Va., Ga., Utah. 5th, Ill., Kan., Va., Col., Tex., Fla., Ga., Mo., Utah. 6th, Ala., Ill., Mo., Ohio, Tenn., Va., Ind., Nebr., Dak., Tex., Miss.,

La., Iowa, Minn., Ky., Ga. 7th, Ala., Dak., Ind., Nebr., Ohio, Va., Fla., Iowa, Minn., Ill., Ga., Mo., S. C., Tex., Wis. 8th, Ala., Conn., Ind., Kan., Md., Mass., Nebr., N. J., N. Y., Ohio, Pa., Tenn., Va., Wis., Dak., Montana, Ind. Ty., Fla., Minn., Mich., W. Va., Ill., Ky. 9th, Conn., Dak., Del., Kan., Me., Md., Mass., Nebr., N. J., N. Y., Pa., Va., Wis., R. I., Tex., Fla., Ala., Miss., Minn., Mich., Ill., Iowa. 10th, N. Y., Col., Conn., Dak., Iowa, Mass., Mich., N. J., Ohio, Pa., Vt., Va., Montana, Tex., Ala., W. Va., Md., Wy. Ty., Ill., Nebr. 11th, Ala., Col., Ill., Ind., Iowa, Mass., Ohio, Va., Wis., N. M., Dak., Tex., Minn., N. Y. 12th, Col., Del., Ind., Md., N. H., N. J., N. Y., Ohio, Pa., Va., Fla., N. M., Tex., Minn., Dak., Mich., W. Va., Wy. T., Ill., S. C. 13th, Col., Ind., Kan., Miss., Ohio, Va., Dak., Tex., W. Va., Ill., Ky., Fla., Ga., N. C. 14th, Col., Dak., Ia., Kan., Me., Mass., Nev., Tex., Minn., Wis., Mich., Tenn., Ga., S. C., Ill. 15th, Ill., Mass., Fla., Utah, Col., Tex., Dak., Minn., Wy. Ty., Ia. 16th, Dak., Va., Neb., Kan., Fla., Minn., Wis., Mich., Ia. 17th, N. Y., Ill., Ind., Kan., Me., Mich., Mo., N. H., Vt., Va., Wis., Fla., Ia. 18th, Dak., Ind., Mass., N. H., N. J., N. Y., Ohio, Pa., Va., Ill., Tex., Minn., Ia., Mich., Ky., Ga., Mo., Neb. 19th, Col., Ia., Md., N. J., N. C., Pa., Tenn., Va., Dak., N. M., Tex., Fla., W. Va., S. C., Mass., Ill., Mo., Neb. 20th, Col., Fla., Ill., Md., Neb., N. Y., Ohio, Tenn., Va., R. I., Ind., Wy. Ter., N. M., Ala., Ga., Ia. 21st, N. Y., Col., Conn., Kan., Me., Md., Mass., N. H., N. J., N. C., Pa., Tenn., Vt., Va., La., Ga., R. I., S. C., Tex. 22nd, Col., Dak., Miss., Va., Wy. Ter., Mont., Fla., Tex., S. C., Ga., Utah. 23rd, Col., Dak., Kan., Vt., Utah, Nev., Mont., Tex., Ala., La., Fla., N. H., Wy. Ter., Neb. 24th, Col., Kan., Fla., Mont., Tex., Wy. Ter., Ia. 25th, Col., Kan., N. H., Wis., Fla., Utah, Wy. Ter., Neb., Minn., Ia. 26th, Col., Ga., Ill., Ind., Mo., N. Y., Tenn., Ind. Ter., Tex., Ala., Fla., Ia., Ky., Utah. 27th, Col., Ga., N. C., Tenn., Va., N. M., Neb., Dak., Tex., Ala. 28th, Ga., Kan., Neb., N. C., Tenn., Va., Dak., Tex., Ala., Miss., La., Mo. 29th, Dak., Del., Ga., N. C., Ohio, Pa., Tenn., Va., Fla., Minn., W. Va., Ill., Md., N. J., Tex. 30th, Ala., Ind., Neb., N. J., Ohio, Va., Kan., Minn., Mo., Mich., Ga., Ill., Ia., S. C. 31st, Dak., Ill., Ind., Ia., Mich., N. J., Ohio, Va., Ala., Tex., W. Va., Ga., S. C., N. C., Md., Neb.

*Auroras*.—Clear Creek, Neb., 1st, 2nd, 3rd; Milwaukee, Wis., 15th; Flushing, N. Y., 25th; Vevay, Ind., 21st, 31st.

*Magnetic Phenomena*.—Prof. G. Hinrichs, Iowa City, Iowa, reports the average magnetic diurnal range in declination as 8.7 minutes.

*Telegraphic communication interfered with by Atmospheric Electricity*.—Santa Fe, 5th, 15th, 17th, 18th, 21st, 24th; 11th, severe thunder-storm, telegraphic instruments cut out; 12th, severe thunder-storm, lines worked with difficulty; 19th, 20th, 27th, severe thunder-storm, wires cut out. Concho, Tex., 13th, 14th, 26th. Griffin, Tex., 26th. Laredo, Tex., 25th. Boerne, Tex., 26th to 29th. Burlington, Iowa, 31st. Pembina, Dak., 6th, electricity intense, wires entirely unmanageable, "sparks from switch-board to lightning arrester two feet in length; 18th, instruments and wires completely unmanageable, continually emitting sparks, although cut out, lightning arrester fused; at Grand Forks wires were burned up; 25th, earth currents very strong, interfered with lines; 29th to 31st, electrical disturbance continued throughout entire days. Sandy Hook, N. J., 9th, 21st.

## OPTICAL PHENOMENA.

*Solar Eclipse*.—A summary of the observations of the Solar Eclipse of July 29th will appear in the REVIEW for August.

*Solar Halos*.—1st, Tex. 3rd, Ohio. 4th, Ohio, S. C. 5th, Ohio, Miss. 6th, Ala., R. I., Ind., Miss., Ohio. 7th, Ala., La., Ohio, Ga., Ind., Miss. 8th, Ohio, Neb. 9th, Ill., Pa. 10th, Ill. 11th, Ohio, Ill., N. H., N. Y. 12th, Ala., Ohio, Ga., N. H. 13th, Ga. 16th, Neb., N. Y., R. I., Conn., N. H. 19th, Ill., N. Y. 20th, Ohio, Fla., Ill., Ind. 21st, Dak. 22nd, Ohio. 23rd, Ill., Mo. 25th, Ohio, N. Y., R. I., Conn. 26th, Ga., Ohio. 27th, N. Y. 28th, Tex., S. C., Ill., Ind., Mich., N. Y., Ohio, Pa. 29th, Tex., S. C., N. Y., R. I., Conn., Mass., N. H., Me., Vt. 30th, Fla., Ohio, Wis. 31st, N. Y.

*Lunar Halos*.—3rd, Ind. 4th, Tex., Ind. 5th, Tex., N. Y., Ohio. 7th, Tex., La., Ohio. 7th, Tex., S. C., Dak. 8th, Tex., Iowa, Ga., Va., Ohio, Utah. 9th, Kan., Tex., Ala., Mo., Ky., Ohio. 10th, Col., Tex., La., Mo., Pa., Ky. 11th, Tex., La., Mo., Minn., Ohio, N. C. 12th, Cal., Tex., Fla., Mo., Ohio. 13th, Tex., Ga., Mo., Va. 14th, Minn., Mich. 15th, Dak., Iowa, Minn., Ohio. 16th, Mich., N. Y., N. J., Me., Tenn. 17th, Ga., N. C., Va. 18th, Ohio, Conn. 19th, N. Y., Ohio. 20th, Tex., Iowa.

*Mirage*.—New Haven, Conn., 31st, over Long Island Sound.

*Miscellaneous*.—On the 2nd, at Tybee Island, Ga., 5 p. m., "a double rainbow was observed in an apparently cloudless sky." 29th, at Louisville, Ky., "the following curious phenomenon was observed during the solar eclipse:—a bow, almost complete and somewhat similar to a rainbow, formed on the translucent clouds about 10° west of zenith, in the reverse position to that of a rainbow; had the circle been complete, the zenith would have been near the centre." Lieut-Commander Chas. H. Craven, U. S. Navy, observer at U. S. Navy Yard, Mare Island, Cal., reports as follows:—"June 7th—although the sky was completely overcast, the hills and all objects on them were completely visible. I could distinguish trees (single) at more than twenty miles, and see the chimneys and windows in houses over eighteen miles; even the posts and rails of fences could be counted at eight or ten miles to the eastward."

## MISCELLANEOUS PHENOMENA.

*BOTANICAL*.—*Alabama*—1st, in northern portion of state, wheat crop seriously cut off by rust; cotton generally good, and blooming well, some abandoned on account of successive rains; corn crops fine. These conditions also obtain in western Tennessee, northern Mississippi and northern Arkansas. *Canada*—11th,

Ontario, fall wheat crop large and excellent; spring wheat, good but less promising; oats and barley good; peas abundant; rye favorable; corn fine; hay crop large; potatoes, great crop, somewhat damaged by Colorado beetles; all fruits except apples rather short by severe June frosts. Quebec, fall wheat, small crop but good; spring crops suffered from late frosts and droughts; barley, peas and oats very good; potatoes injured by frosts, droughts and Colorado beetles, crop will probably be quite poor; hay crop in eastern part abundant; wheat reduced by local droughts; fruit crop uneven, injured in sections by frosts and insects. *California*—San Diego Co., winter wheat badly rusted, will not get more than half a crop; barley will do better, not a full crop. *Connecticut*—New London, blooming, 2nd, oleander; 20th, passion flower; 22nd, cutting hay commenced. *Colorado*—Summit, 17th, peas up in garden; 20th, potatoes up; 25th, corn, beets and spinach growing well; 31st, radishes ripe. *Dakota*—Minnehaha Co., wheat harvest commenced, very little rust; oats very heavy and lodged some; flax splendid; barley good, cutting. Olivet, harvesting, 8th, barley, 15th, oats; 17th, field corn in tassel. Pembina, 15th, new potatoes and peas; 24th, wheat crop excellent, barley almost ripe, haying begun; 25th, harvesting barley. *Delaware*—1st, wheat crop throughout the state the largest ever harvested. *Florida*—Milton, 30th, corn ripe and harvested. Houston, corn crop good; cotton very promising. *Georgia*—Forsyth, 24th, crops maturing rapidly; season exceedingly favorable to vegetation. *Illinois*—Meredosia, 26th, wheat, corn and potatoes promise well; oats heavy; hay good. Virden, corn very spotted, but little good. Griggsville, winter wheat very heavy, all threshed; oats nearly all cut, yield good. Wheaton, corn growing amazingly; oats heading out very full. Metropolis, wheat only half a crop; oats good, all cut; corn equal to last year. Avon, no rust in wheat; oats heading out well; corn looks splendid. Atlanta, some rust in spring wheat; rye all cut; corn about the average. Prophetstown, oat crop very heavy; no rust in spring wheat, condition excellent; corn equal to last year. Wyoming, winter wheat of very superior quality; rye all cut, very large yield; some rust in spring wheat; corn in good condition. Riley, 8th, commenced haying; 15th, corn in tassel and silk; 22nd, wheat harvest begun. *Indiana*—Benton Co., wheat, very large crop; oats, best ever raised in this county; corn, prospect magnificent for very large crop; potatoes, prospect splendid; fruit crop good. Boone Co., corn, average crop; potatoes, fair; apples, half crop; no peaches. Cass Co., wheat crop very superior; oats, prospect for a very heavy yield; corn in excellent condition; fruit of all kinds abundant and promise well, except grapes, which were generally killed by frost. Clinton Co., oat crop immense; corn, fair; fruit, of all kinds, plentiful; apples and pears, big crop; no peaches or grapes; flax and hay in splendid condition. Greene Co., apples, scarcely an average crop; peaches in abundance, trees breaking down; plums, pears and smaller fruits never more abundant. Knox Co., wheat, decrease in yield, but increase in quality; oats, better than ever known before; corn, fair; potatoes, remarkably good; apples, not half a crop and rather poor; peaches, good, large yield; pears, small crop, trees largely killed by pear-blight, appearing as if struck by lightning. Madison Co., wheat, nearly double the yield of last year; oat crop, very large; corn crop, prospect never better; potatoes, fair; fruit, of all kinds, will yield a full crop, except peaches; there will be a large increase of flax. Monroe Co., oat crop, the best ever harvested; corn crop, good; potatoes, prospect flattering; apples, average crop; peaches, enormous yield, with trees breaking down, but fruit not so large as usual; all other fruits and berries plenty. Montgomery Co., corn crop promises an immense yield; peach crop, largest in five years; apples will be very abundant; grapes, not as good as last year; all small fruits in great abundance. Rush Co., oat crop greater than has been known for many years; corn, about the average; potatoes fair; not many peaches; an abundance of apples, pears and plums; grapes scarce, on account of June frosts. Tippecanoe Co., wheat crop the largest since 1864; oats fair; corn, magnificent prospect for large yield; potatoes, best crop known for several years; fruits fair, average crop. Wayne Co., fruit crop unusually heavy, except apples, which are falling badly; the crop of hemp and hay is unusually abundant. *Indian Territory*—Fort Gibson, 2nd, peaches ripe; 20th, water-melons in market. *Iowa*—McGregor, 24th, winter wheat and rye, yield enormous; oats lodged; barley fair. In northeastern portion of state not a single field of wheat but what is more or less damaged by either blight, rust, or chinch bugs, 27th. Dubuque Co., wheat crop a failure owing to rust and chinch bugs, 27th. Humboldt Co., oats heading well, corn growing wonderfully; wheat somewhat injured by the hot weather. Scott Co., rye and barley nearly all cut; rye good; barley colored; oats heading well, heavy crop; spring wheat injured by rust and hot weather. Emmet Co., barley fit to cut, oats heavy both in head and straw; wheat very much damaged by hot weather; corn half a crop. Keokuk Co., rye harvested; spring wheat excellent, heads well filled; oats very heavy and in many instances lodged. Butler Co., oats only a fair crop; all crops will be poor owing to blight and rust. Clear Lake, crops suffering greatly from heat and storm; much of the grain is badly rusted, and oats and wheat are flat. Nora Springs, the ground is so wet as to seriously impede harvesting with machines, and the hot weather prevents the grain from filling and blights it very badly. Ft. Madison, 4th, apples ripe. Vail, corn very promising. *Kansas*—Labette Co., wheat yielding from sixteen to twenty-eight bushels per acre. Neosho Co., winter wheat yielding from fifteen to thirty bushels; corn doing well. Elk Co., winter wheat yielding twenty-five bushels; oats all cut; corn better than last season. Chautauqua Co., winter wheat yielding eighteen bushels; corn equal to last year. Butler Co., winter wheat mostly in stack, some threshed, yielding twenty-four bushels; corn far ahead of last year. Cresswell, wheat harvested; timothy ripe. Holton, 31st, wheat harvested and threshed, best crops ever known in this locality; wheat yields from twenty to twenty-six bushels per acre. Independence, 30th, grapes ripe. *Kentucky*—Boyd Co., oat crop very fine, heavy yield; corn fair; potatoes, prospects good; apples show but one-half of a crop, while peaches are a total failure; small fruits in abundance. Carroll Co., oat crop, yield very large of fine heavy grain; corn, prospects very flattering; potatoes show an unusually fine condition;



tobacco very good, topping has begun; rye and hay crops unprecedentedly heavy; fruit on high lands unusually good. Fayette Co., oats excellent; fruit crop very small; apples are not plentiful, and peaches are very scarce; hemp crop promises well. Fleming Co., potatoes, best crop for many years; apples scarce; peaches, plums and pears one-fourth of a crop; tobacco good. Franklin Co., tobacco crop very poor; potatoes promise a heavy yield; oats very heavy, yield large. Garrard Co., apples, very heavy crop, but very few peaches; grapes not good; corn crop never better. Graves Co., apples poor; peach crop very heavy; potatoes, average crop. Hart Co., corn crop, prospects for an extraordinary yield; oat crop, very light, owing to rust; wheat only medium. Harrison Co., heaviest harvest known for years; potatoes excellent; apples, half a crop; peaches, two-thirds of a crop; cherries total failure. Jessamine Co., apples good, but other varieties of fruit an entire failure; corn, prospect flattering. Larue Co., oat crop splendid; potatoes excellent; fruit of all kinds the best for years; rye crop unusually large. Marion Co., corn crop promises to be one of almost unparalleled abundance, fruit crop good, except peaches, which are rotting. Mercer Co., potato crop promises to be unusually heavy. *Massachusetts*—Somerset, harvesting, 5th, rye, 17th, oats; 20th, sweet corn for use. *Maryland*—Fallston, 16th, oats harvested; 1st, timothy cut; ripe, 5th, raspberries, 12th, blackberries, 19th, tomatoes, 26th, sweet corn. *Michigan*—Detroit, crops of all kinds in excellent condition; one of the most favorable seasons for vegetation; wheat considerably above the average in quantity and quality; oats and hay both above the average; corn, average crop; potatoes very good; fruit below the usual yield. *Minnesota*—24th, Hokah, wheat very good. Mound Prairie, 24th, wheat greatly injured by blight and rust. Lanesboro, 24th, wheat greatly injured by hot weather. Lake City, 24th, wheat harvesting began, much injured by blight. In southern portion of state wheat much blighted, 27th. Blue Earth Co., the best fields of wheat are lodged, tangled and more or less rusted; barley and oats are all lodged. Meeker Co., rye and barley harvested, crop heavy and good; winter wheat is very heavy; spring wheat rusted on the leaves. *Missouri*—Sage Co., wheat all stacked; no effort made to thresh or sell; oats all cut, very good crop; corn not as good as last year. Oregon, 8th, peaches ripe; ripening, 14th, apples, 17th, tomatoes; blooming, 7th, phlox, 11th, tiger lilies. Springfield, 24th, sweet potatoes, and 30th, grapes in market; 31st, melons ripe; wheat and oats very good; magnificent prospect for corn; fruit in great abundance. *Nebraska*—Boone Co., rye, barley and wheat harvested, prospects very good; oats, very good; no injury to grain from rust. Franklin Co., rye, and barley harvested, rye is an average crop, but barley is very heavy; oats are well headed and promise a large crop; no injury from rust, and no grain lodged; corn never looked better. Clear Creek, harvesting, 5th, barley, poor crop, 15th, wheat. *New Jersey*—Vineland, month very favorable to growth of vegetation; corn, grass, and potatoes in excellent condition. *New Hampshire*—Dunbarton, apples and corn fair; wheat below the average; largest crop of hay for ten years; potatoes damaged by Colorado bugs; 30th, wheat harvest begun. *New York*—12th, in northern portions of the state, wheat plentiful; straw tall but stout; heads full; harvest commenced some weeks early; hay-cutting begun, crop large but much mixed with daisies; potatoes fine; oats heading well, quite heavy; apples, large yield; all crops somewhat injured by a cold snap. Palermo, 9th, corn in tassel; 19th, harvesting oats; ripe, 19th, early apples; 20th, blackberries; 28th, early pears. Kensico, blooming, 4th, chestnut. Wappingers' Falls, 1st, cutting hay; 2nd, sowing buckwheat; blooming, 3rd, morning glories, catnip; 7th, hollyhocks; harvesting, 5th, wheat and rye; 7th, sweet corn topping out; ripe, 15th, early apples and tomatoes; 8th, gooseberries; 9th, blackberries; 8th, corn 2½ feet high, oats in good condition; 11th, apple crop being destroyed by black lice; 15th, field-corn topping out; 19th, corn in silk, cutting oats. Starkey, harvesting, 6th, wheat; 13th, barley; 20th, oats; 16th, threshing wheat; ripe, 18th, blackberries. Vernon Centre, 18th, haying finished; 20th, wheat harvest nearly completed, crop very light; 31st, hops just out of the burr; oat harvest begun, crop fair. *New Brunswick*—11th, spring grains, potatoes, roots and fruits promise abundant harvest. *Nova Scotia*—11th, canker-worm seriously damaged apples and plums. *Ohio*—Allen Co., wheat, an unprecedented crop; oats promise a very heavy yield; corn, prospects good; potatoes, crop will fall short of last year, owing to rot, which has already set in; fruit prospects encouraging. Ashtabula Co., wheat, very heavy yield; oats, heavy yield; grain of superior quality; corn, good crop; potatoes, prospects for a good crop; fruit of all kinds in fine condition. Belmont Co., wheat very good; oats, better quality than last year; potatoes, below average; apples very promising, excellent crop of peaches, pears and plums and great abundance of grapes. Clermont Co., wheat, excellent in quantity and quality; oats, prospects fair; corn, never looked better; potatoes very fine; fruit in the finest condition, except peaches, which are almost a failure. Gallia Co., wheat and oats about the same as last year; corn crop very uneven, prospects poor; potatoes, whole crop in desperate condition, vines dying and dead from bug and drought; fruit, every kind excellent, except peaches. Guernsey Co., fruit never better, except in low lands, where it was injured somewhat by frost. Harrison Co., wheat crop all harvested, largest and best for many years; apples, peaches, cherries and plums are in great abundance, particularly the two former, which is the largest crop in many years. Hancock Co., potatoes a failure, on account of the plant being attacked by a small louse, that destroyed both roots and vines. Highland Co., grapes, very heavy yield; peaches, best yield for many years. Hocking Co., fruit, condition and prospects for all kinds never better, except grapes; there never was such an abundance of all crops in this county. Montgomery Co., wheat crop extraordinary; oats in splendid condition; corn, never in better condition; potatoes growing excellently; an unexampled year for gardening; fruits of all kinds show a great increase. Wyandot Co., apples and peaches immense, other fruits plenty. Putnam Co., wheat crop the largest yield ever known in this locality; corn considerably damaged on bottom-lands; potatoes below average on up-lands, but on prairie lands an immense yield; fruit crop hardly up to average. *Tennessee*—Davidson Co., the sale of wheat is very slow, only about half a crop; oats very good; corn is better than last year; tobacco growing well.

*Texas*—Melissa, weather very favorable to the growth of cotton, prospects of a very large crop; from north to south, throughout the state, all crops look very fine; corn crop as good as ever seen in the state; farmers plowing stubble land. Clarksville, corn crop prospect excellent; cotton far above the average; small fruit abundant. *Virginia*—Broad Oak, 15th, corn in silk; 31st, harvesting oats, grapes ripening. *Wisconsin*—La Crosse, 16th, wheat and oat crop severely reduced by rust, lodging and shrinkage; similar reports from several adjoining counties. Burns, 24th, owing to frequent rains, intense heat, rust, and grubs, spring wheat is badly blighted, oats badly lodged, and hay much damaged. Bangor, 24th, winter wheat good, spring wheat poor, barley and oats lodged, corn partly injured by grubs. West Salem, 24th, wheat poor, from blight, rust and lodging; corn looks well. Arcadia, 24th, wheat injured by rains and heat; corn looks well; oats and rye good; potatoes well; hay much ruined by water. Barron Co., winter wheat and barley nearly ready to cut, average crop; spring wheat, heaviest crop ever raised, if it escapes rust of which there is some danger owing to hot and moist weather. Eau Claire Co., rye and wheat being harvested, very good crop; spring wheat in good condition, heavy growth; oats good; corn not as good as last year. Embarrass, weather very favorable to growth of vegetation, all crops unusually fine.

**MISCELLANEOUS.**—*Locusts*: Olivet, Dak., flying from N. E., 20th and 27th; N. W. 30th. Coalville, Utah, flying N. E., 1st, 9th, 11th, 17th in large numbers, 18th in large numbers, 19th in large numbers; S. E., 6th, 12th, 15th in large numbers, 27th air full of them, 23rd, 25th and 26th in immense numbers; E., 8th, 9th, 12th, 14th in immense numbers, 29th immense swarms, 31st; S., 14th in immense numbers, 27th air full of them. Locusts destroyed nearly all the crops in Summit county, Utah. Salt Lake City, 20th, vast numbers, between 2 and 3 p. m., flying S., against the wind, very few lighted. North Platte, 15th, 1 to 3 p. m., flying NW., in small numbers, but none lighted; 17th and 22nd, flying NW. with the winds. Dodge City, 9th, from 10 a. m. to 3 p. m., small numbers seen at an elevation varying from 200 to 800 feet, flying SW. with the wind. Jacksboro, Texas, 30th, quite a large number have appeared, large size, light yellow and pale green color, came from the N. during preceding night. Winnemucca, Nev., 11th, great numbers made their appearance; 13th, all disappeared; 18th and 19th, large swarms; have not been so numerous for many years. Virginia City, Mont., 25th, flying NW.; 27th, 28th, large numbers, doing some damage to gardens; 30th, disappeared. Pembina, 23rd, in small numbers, a few west of station. *Katyids*: Holton, Kan., 13th; Baxter Springs, Kan., 5th; Murphy, N. C., 12th; Webster, N. C., 24th; Ringgold, Ohio, 13th; Jacksonburg, Ohio, 27th. *Crickets*: Ringgold, Ohio, 14th. *Grasshoppers*: Palermo, N. Y., 24th, plenty; Newark, N. J., 14th. *Bobolinks*: Palermo, N. Y., 30th. *Army Cotton Worm*: Virginia Point, near Galveston, Tex., 1st, first appearance this season.

*Meteors*.—Winnemucca, 25th, 26th; Castroville, Tex., 2nd; Davis, Tex., 28th, 30th, 31st; New Orleans, 8th, 9:10 p. m., very brilliant meteor, orange color, motion from W. to E., leaving a trail of about 8°; St. Paul, 29th; Chicago, 6th, large and brilliant meteor at 3:05 a. m., appeared within the constellation, Asia Minor, and disappeared near the horizon a little south of Libra, size of full moon, visible 12 sec., gave light three times the intensity of moon on clear night, left luminous cloud covering entire track, which disappeared gradually from W. to E., lasting 11 sec.; Indianapolis, 6th, at 3:00 a. m. large areolite struck the earth north of the city, leaving brilliant train visible nearly one minute, 27th; Logansport, Ind., 6th; Savannah, Ga., 19th; Fort Whipple, Va., 26th; Vevay, Ind., 31st; Monticello, Ia., 12th; Baxter Springs, Kan., 9th; Holton, Kan., 11th; Cresswell, Kan., 26th; near Woodstock, Md., 17th, 25th, 26th; Fallston, Md., 26th; Rowe, Mass., 28th; Northport, Mich., 25th; Litchfield, Mich., 29th; near Brookhaven, Miss., 23rd, 25th, 29th; near Fayette, Miss., 26th; Corning, Mo., 22nd, 25th; Emerson, Neb., 30th; Clear Creek, Neb., 26th, 29th, 30th; Wappinger's Falls, N. Y., 16th; Aiken, S. C., 31st; near Melissa, Tex., 3rd, 20th; near Dover Mines, Va., 26th; Petersburg, Va., 9th, 3 a. m., brilliant meteor in S. E., altitude 30°, accompanied by a sharp hissing noise for 15 seconds; Austin, Nev., 29th.

*Polar Bands*.—New Corydon, Ind., 1st, 20th, 23rd, 28th; Tabor, Ia., 23rd; Gardiner, Me., 11th, 12th, 18th; near Fayette, Miss., 15th, 16th; Auburn, N. H., 29th; Jacksonburg, Ohio, 17th; Wytheville, Va., 11th, 26th; Burlington, N. H., 29th.

*Zodiacal Light*.—Daytona, Fla., 1st, 2nd, 3rd, 16th to 19th, 21st, 22nd; Monticello, Iowa, 1st.

*Prairie and Forest Fires*.—Creswell, Kan., 19th; Barnegat, N. J., 23rd, large fires in pine woods inland; 26th, pine forest on fire in upper Ottawa valley, Canada; 6th, Quebec, Canada, bush-fires in all directions, occasioned by drought, dense smoke in city; 7th, fires continued to spread, smoke on St. Lawrence delayed steamer from Montreal fourteen hours, immense fire back of Three rivers, destroying miles of North Shore railroad track.

*Earthquakes*.—U. S. Naval Hospital, Yokahama, Japan, reports, June 17th, 5:20 a. m., shock of earthquake, duration 40"; 22nd, 12 m., smart shock, duration about 35"; 28th, 6:35 p. m., smart shock. At Tanna, New Hebrides Island, South Pacific, (date not given,) "great earthquake, which raised the land along the shore and harbor about 20 feet. Millions of fish were thrown up and destroyed." July 11th, at St. Thomas, W. I., midnight, severe shock of earthquake. 26th, Los Angeles, Cal., 8:25 a. m. slight shock, motion N. to S., lasting one second; San Geronio, Cal., 9:15 a. m., slight shock, direction S. to N., duration about five seconds, house shook and crockery rattled; slight tremor also felt at Cotton, Riverside and San Bernardino; 2nd, Campo, Cal., 5h., 55', 30", two slight shocks, from SE. to NW., first shock of 2" duration, second of 3" duration; heavy noise resembling thunder.

*Sunsets.*—The characteristics of the sky, at sunset, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service Stations. Reports from 120 stations show 3,635 observations to have been made, of which 63 were reported doubtful. Of the remainder 2,991, or 82.3 per cent, were followed by the expected weather.

*U. S. Signal Service Telegraph Lines.*—In illustration of the usefulness of this branch of the service, the following letter is published, viz:

SMITHVILLE, N. C., July 31, 1878.

Chief Signal Officer of the Army:

Sir: I have the honor to forward herewith copies of International Code Signals exchanged between this station and the Spanish brig "Dos Cunados," while the latter was ashore and in distress near Caswell Beach, about three miles south of Smithville.

The "Dos Cunados," bound from Wilmington, N. C., to Antwerp, with naval stores, ashore on the bar July 26th, and, getting afloat the following day, drifted into a dangerous shoal close to the beach. She sprung a leak and filled early on the morning of the 29th; discharged cargo and finally got afloat at 6:25 p. m., of the same day. She was towed back to Wilmington for repairs.

The signals were valuable in procuring the aid of tugs and lighters whenever wanted; especially so, because the Captain of the brig was ignorant of the English language.

Very respectfully,

Your obedient servant,

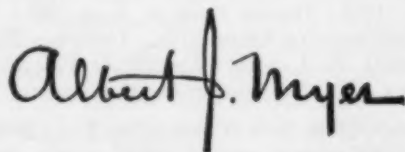
ROBERT SEYBOTH,

Sergeant, Signal Service, U. S. A.

The signals exchanged referred to requests from the Captain for lighters and tugs, and the position and condition of his vessel. The facts were at once telegraphed to the Chief Signal Officer, and by him to the wrecking companies and others.

*Sun-spots.*—Prof. Gustavus Hinrichs, Iowa City, Iowa, reports that the sun's disk was examined on sixteen days, and not a spot was seen. Observations were also made at Fort Whipple, Va., on the 1st, 2nd, 3rd, 4th, 5th, 6th, 8th, 9th, 11th, 13th, 22nd, 23rd, 25th, 26th and 28th, and no spots observed.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

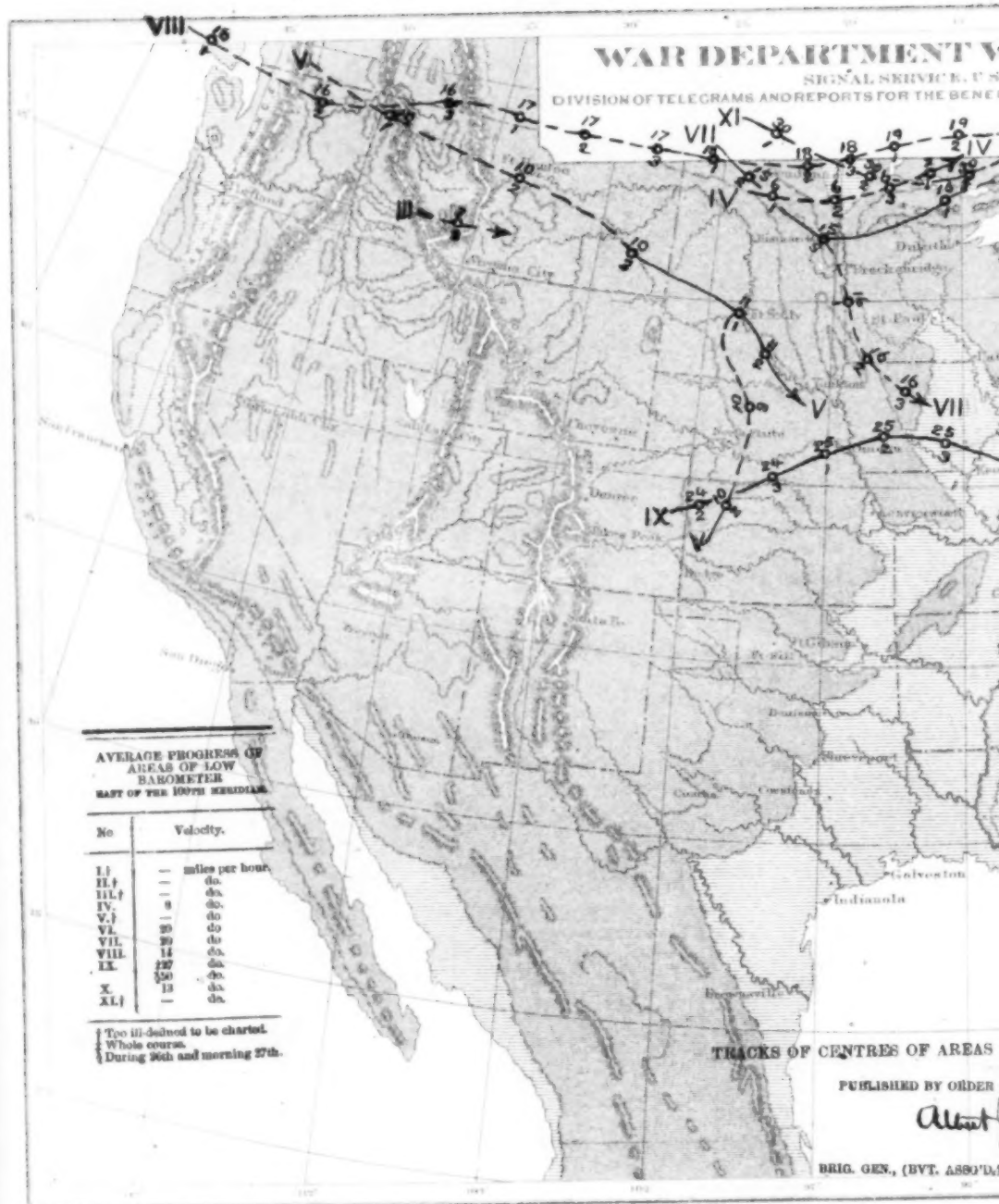


Brig. Gen. (Bvt. Assg'd.) Chief Signal Officer, U. S. A.

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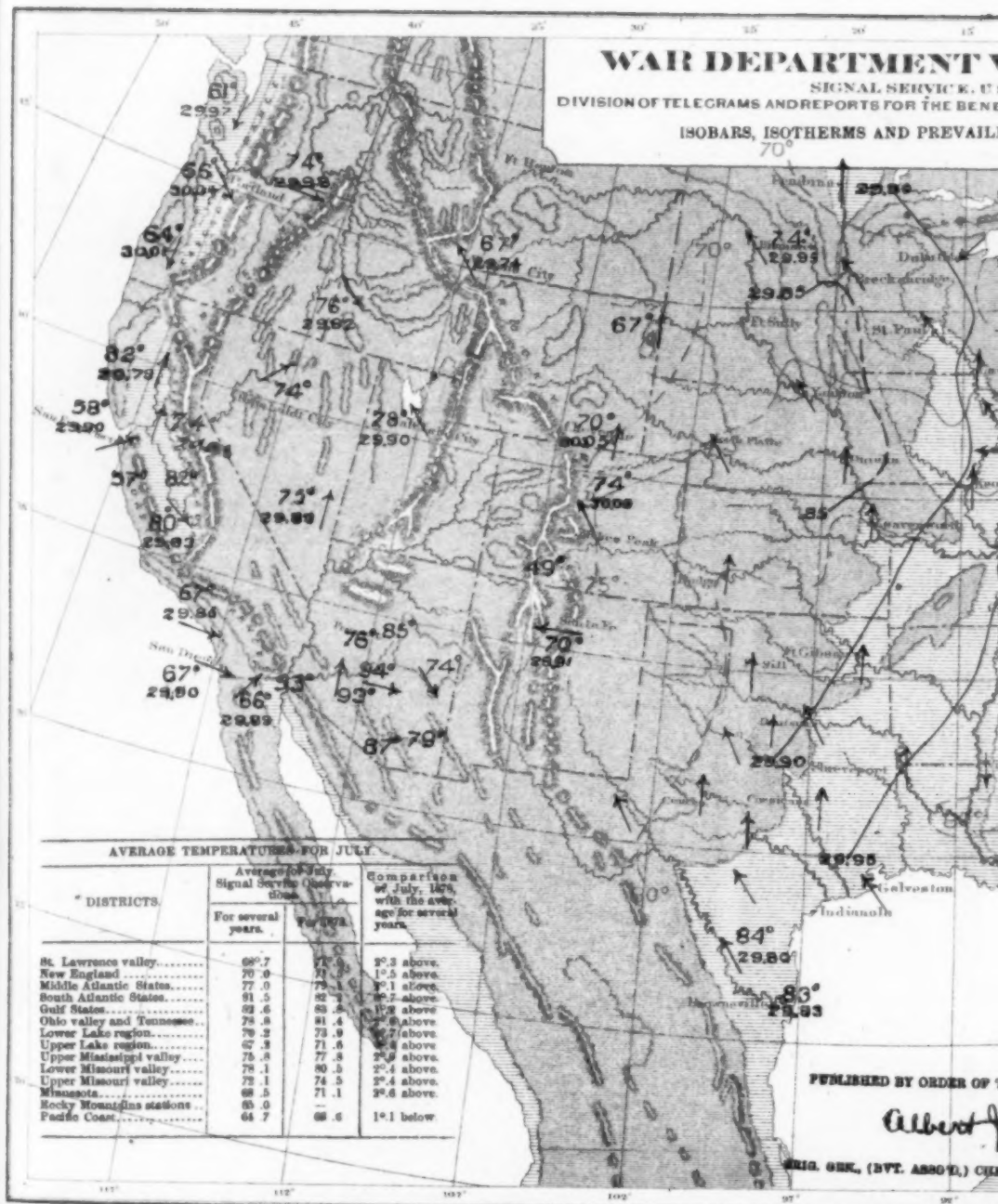
No. I.

# WENT WEATHER MAP.

SERVICE, U. S. NAVY.  
FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

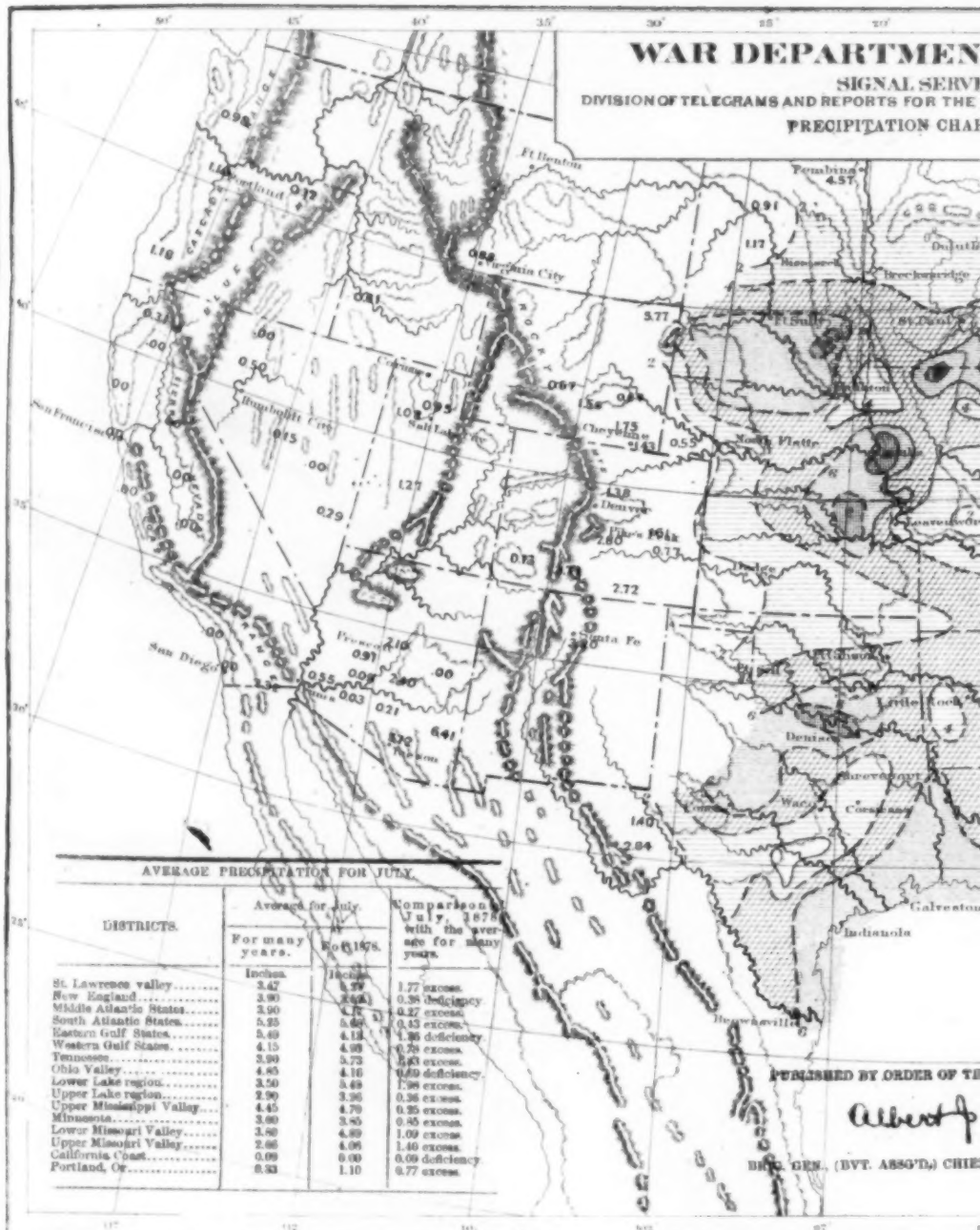








**WAR DEPARTMENT**  
SIGNAL SERVICE  
DIVISION OF TELEGRAMS AND REPORTS FOR THE  
PRECIPITATION CHART



AVERAGE PRECIPITATION FOR JULY.

DISTRICTS.	Average for July.		Comparison with the average for many years.
	For many years.	For 1918.	
	Inches.	Inches.	
St. Lawrence valley.....	3.47	3.79	1.77 excess.
New England.....	3.90	2.44	0.38 deficiency.
Middle Atlantic States.....	3.90	4.77	0.27 excess.
South Atlantic States.....	5.25	4.46	0.53 excess.
Eastern Gulf States.....	5.49	4.13	1.36 deficiency.
Western Gulf States.....	4.15	4.99	0.78 excess.
Tennessee.....	3.90	3.73	0.03 excess.
Ohio Valley.....	4.85	4.16	0.69 deficiency.
Lower Lake region.....	3.50	3.49	0.01 excess.
Upper Lake region.....	2.90	3.96	0.38 excess.
Upper Mississippi Valley.....	4.45	4.79	0.35 excess.
Minnesota.....	3.00	3.40	0.40 excess.
Lower Missouri Valley.....	3.60	4.89	1.09 excess.
Upper Missouri Valley.....	2.60	4.96	1.40 excess.
California Coast.....	0.09	0.00	0.09 deficiency.
Portland, Or.....	0.93	1.10	0.77 excess.

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*Albert*

BRIG. GEN. (BVT. ASST. ADJ. GEN.) CHIEF



